NANO

Flight recorder
(including NanoConfig configuration program)

Version 1.0

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1 Important Notices

Information in this document is subject to change without notice. LXNAV reserves the right to change or improve their products and to make changes in the content of this material without obligation to notify any person or organization of such changes or improvements.

A Yellow triangle is shown for parts of the manual which should be read very carefully and are important for operating the NANO flight recorder.

Notes with a red triangle describe procedures which are critical and may result in loss of data or any other critical situation.

A bulb icon is shown when a useful hint is provided to the reader.

1.1 Limited Warranty

This NANO product is warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, LXNAV will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour, provided that the customer pays for shipping costs. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alterations or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL LXNAV BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT.
Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. LXNAV retains the exclusive right to repair or replace the unit or software, or to offer a full refund of the purchase price, at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service contacts your local LXNAV dealer or contact LXNAV directly.

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1.2 Battery information

NANO is powered by a rechargeable battery. The battery can be charged and discharged hundreds of times, but it will eventually wear out. Only use the approved battery and recharge your battery only with approved chargers.
Unplug the charger from the electrical plug and the device when not in use. Do not leave a fully charged battery connected to a charger as overcharging may shorten its life. If left unused, a fully charged battery will lose its charge over time. Use the battery only for its intended purpose. Never use any charger or battery that is damaged.
If the battery pack is mishandled, the battery pack can burst, cause a fire or even chemical burns. Observe the following precautions.

- Do not disassemble.
- Do not crush and do not expose the battery pack to any shock or force such as hammering, dropping or stepping on it.
- Do not short circuit and do not allow metal objects to come into contact with the battery terminals.
- Do not expose to high temperature above 60°C (140°F) such as in direct sunlight or in a glider parked in the sun.
- Do not incinerate.

- Do not handle damaged or leaking lithium ion batteries.
- Be sure to charge the battery pack using supplied battery charger or a device that can charge the battery pack.
- Keep the battery pack out of the reach of small children.
- Keep the battery pack dry.
- Replace the battery pack only with the same or equivalent type recommended by LXNAV.
- Dispose of used battery packs promptly as described in these instructions.

1.2.1 Disposal of Old Electrical & Electronic Equipment

(Applicable in the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

1.2.2 Disposal of waste batteries

(Applicable in the European Union and other European countries with separate collection systems)

This symbol on the battery or on the packaging indicates that the battery provided with this product shall not be treated as household waste. By ensuring these batteries are disposed of correctly, you will help prevent potentially negative consequences for the environment and human health which could otherwise be caused by inappropriate waste handling of the battery. The recycling of the materials will help to conserve natural resources. In case of products that for safety, performance or data integrity reasons require a permanent connection with an incorporated battery, this battery should be replaced by qualified service staff only. To ensure that the battery will be treated properly, hand over the product at end-of-life to the applicable collection point for the recycling of electrical and electronic equipment. For all other batteries, please view the section on how to remove the battery from the product safely. Hand the battery over to the applicable collection point for the recycling of waste batteries. For more detailed information about recycling of this product or battery, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

(Applicable for Customers in the U.S.A. and Canada)

Lithium-Ion batteries are recyclable. You can help preserve our environment by returning your used rechargeable batteries to the collection and recycling location nearest you. For more information regarding recycling of rechargeable batteries, call toll free 1-800-822-8837, or visit http://www.rbrc.org/

Do not handle damaged or leaking Lithium-Ion batteries.

2 Packing Lists

In the box you will find:

- NANO flight recorder with preloaded Nanoconfig program and user manual

- NanoPower cable

- USB cable

- Wall charger

- Barogram calibration chart
- Quick reference chart

3 Basics

3.1 NANO at a glance

The NANO flight recorder is the smallest flight recorder designed in accordance "All Flights" IGC specification. It has an IGC approval for all flights including world records. It features an integrated 66-channel GPS receiver with built-in antenna, altitude sensor, ENL sensor, security micro-switch, Bluetooth module and 1700mAh battery.
The built-in battery allows up to 12 hours of stand-alone operation. The battery is charged when the flight recorder is connected to a computer, NanoPower or wall charger.
Bluetooth is used for easy data exchange with a PDA.

The housing is made of robust ABS plastic. On the left side there is a micro-SD card slot, rocker button and five status LEDs. LEDs display the operational status.
A 2 GB SD card is used for flight data storage. Flights are stored directly in IGC format and are downloadable through a USB connection which is compatible with all operating systems (MS Win, Linux and Mac OS).

On the right side there is small hole with a reset button. Use a pin to press the reset button. In normal operation, this button should never be used.

At the back there is a mini USB connector, which is used for charging and data transfer.
The SD card is preloaded with the Nanoconfig program, which is used for uploading flight declaration and changing the settings of the NANO. Flight declarations can be also uploaded using a serial interface cable or Bluetooth (See chapter 5.1 for more details).

3.2 Technical data

Hardware

- ARM7 core processor running on 60 MHz clock
- 2GBytes memory storage
- Three direction rocker button
- 66-channel GPS receiver
- Engine noise level sensor
- Pressure altitude sensor measuring up to 16000m

Input and output

- USB interface (mass storage device)
- Integrated SD card reader
- Serial RS232 interface for PDA connection
- Bluetooth interface for PDA connection

Size and weight

- Outline dimension: 60x40x20mm
- Weight: ~66g

3.3 Rocker button

The rocker button has several actions; you can press it or move it up or down.

Press it and NANO flight recorder will power on. Press or move the rocker button for a long time and the NANO flight recorder will switch off. When flying press or move the button for a short time and a pilot initiated event will be recorded and the flight recorder will then log 30 fixes with a recording rate of one second.
At the same time the LEDs will indicate the battery status.

3.4 LEDs

On the left side there are five LEDs; four green and one red. The LEDs show the status of the NANO flight recorder. During normal operation, the first LED blinks when NANO is powered on. The second LED blinks when GPS status is ok. The third LED blinks when recording of flight is started. The fourth LED blinks when the Bluetooth module is switched on.
More details about LEDs behaviour will be given in the next chapters.

3.5 NanoPower cable

The NanoPower is a special device, which converts 12V to 5V power supply for NANO and PDA. It also translates levels of serial signal to match NANO signal level and PDA or computer signal level.

Connect the red and black wire to 12V power supply.

Maximum input voltage is 24 Volts.

The NanoPower has two plugs. On one side there is a standard USB-A connector. Use included USB-A to mini-USB cable and plug NANO to this side. Any standard USB-A to mini-USB cable is suitable. On the other side there is a RJ45 plug. This plug is designed for a PDA or a computer.

RJ45 plug is NOT designed in accordance with IGC standard. It can be used only with dedicated cable. Do not plug unknown cable to it as it may damage NanoPower circuit.

Pin description on the NanoPower RJ45 is given on a picture below.

1 2 3 4 5 6 7 8
Pin numbers

Pin number	Description
1,2	Ground
3	(output) Transmit from NANO RS232 (e.g. Computer, LX7000)
4	(input) Receive to NANO RS232 (e.g. Computer, LX7000)
5	(output) Transmit from NANO TTL (e.g. Oudie, HP302)
6	(input) Receive to NANO TTL (e.g. Oudie, HP302)
7,8	5V OUTPUT (maximum 1A)

4 Operation

There are two modes of operation **Data transfer** mode and **Normal operation** mode.
When in data transfer mode, flight can be downloaded and NanoConfig can be run. Normal operation mode is when logger is ready for recording flights.
The mode in which the NANO is operating can be determined from the LEDs.
In **data transfer mode** the last two or three green LEDs will be permanently lit whereas in **normal operation mode** up to four LEDs will be blinking. See chapter 4.2 for a detailed explanation of each LED.

4.1 Powering on

There are three ways to power on NANO flight recorder.
Press rocker button and NANO will power on. It will go directly to normal operation mode. The LEDs will first perform a self test blinking from left to right and then the NANO will go to normal operation mode and indication on the LEDs.
Connect the NANO to a computer using a USB cable. It will automatically power on and the last two or three LEDs will light up. This indicates that the NANO flight recorder is in data transfer mode. You may now run NanoConfig or copy flights using standard methods for copying files.
Connect the NANO to NanoPower. It will automatically power on and after approximately 20seconds the NANO will perform a self-test with blinking LEDs from left to right and then it will go to normal operation mode and indication of LEDs.

If you press or move rocker button, when in data transfer mode, NANO will revert to normal operation mode

4.2 Normal operation

During normal operation the first LED blinks when NANO is powered on. The second LED blinks when GPS status is ok. The third LED blinks when flight recording is started. The fourth LED blinks when the Bluetooth module is switched on.

The fifth LED is red and indicates an error. See chapter 6 for more details.

4.3 Battery status

When you press rocker button for a short time the LEDs will show the battery status. If all the LEDs are on it means that the battery is fully charged. During operation as each LED goes out it means 20% less battery capacity remains.

4.4 Powering off

Press the rocker button for a long time and the red LED and the adjacent green LED will start blinking. Once you see this blinking you may release the button.

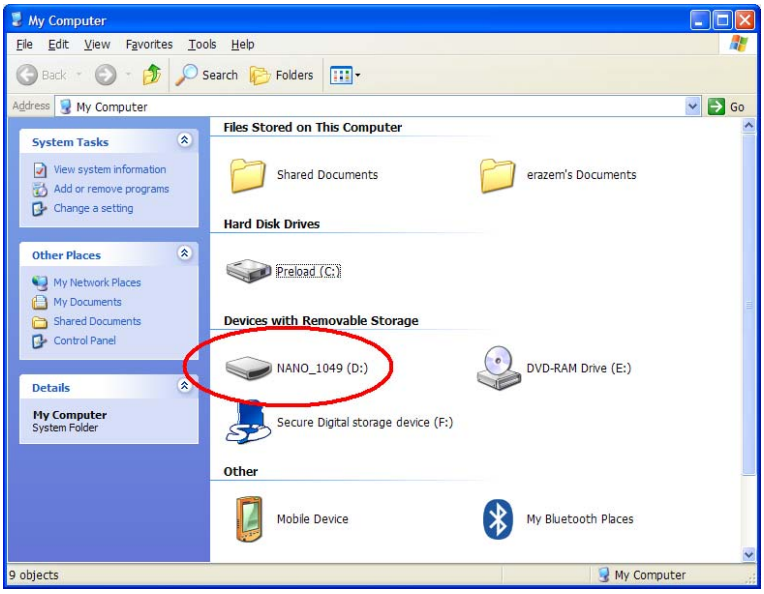
4.5 Security void

When security (secret key) is lost at power on, the red light will be on and the remaining four green LEDs will start blinking. To continue press or move the rocker button for a longer period.

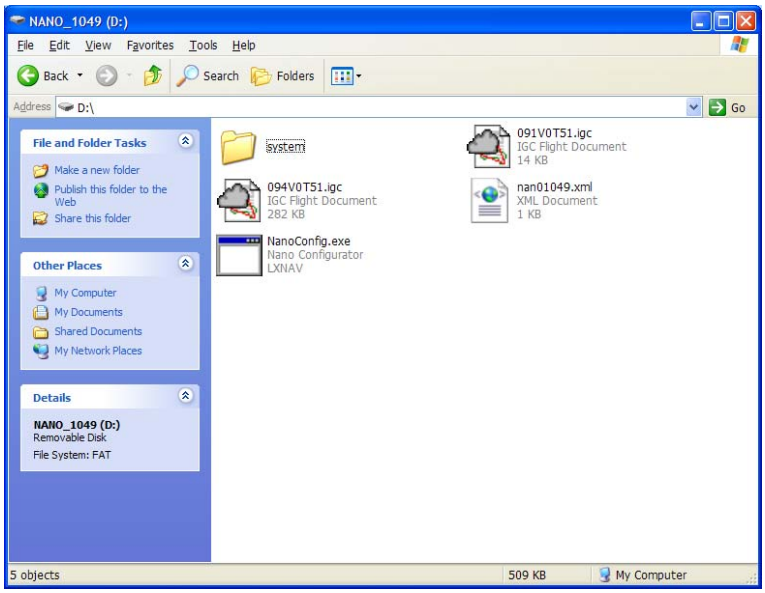
In order to produce IGC-certified files, the NANO flight recorder must be returned to the dealer or manufacturer for resealing.

4.6 Connecting to a computer

Before connecting the NANO to a computer, you must turn it off.
Connect it to a computer using the supplied USB cable or any other standard USB-A to mini-USB cable. The NANO flight computer will be identified automatically and a new removable storage device will be indicated. The name of device will be NANO_<SERIALNUMBER>.



Open this device to see its content.



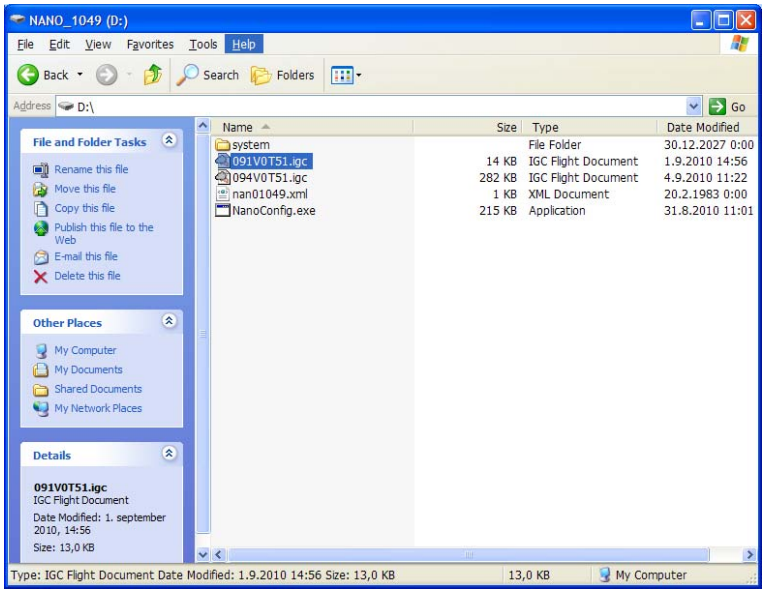
In the root folder you will find flights created by the NANO and the NanoConfig program. The NanoConfig program will run only on Microsoft Windows operating systems. Double click to run it.

On first connection of the NANO to a computer it may not be recognized immediately. Disconnect the NANO from the computer and connect it again in order for it to be recognized.

4.7 Downloading flights

Turn off the NANO and connect it to a computer using a USB cable. Navigate to the root folder of the NANO and use your preferred method of copying files.

We recommend that you always copy your flights to a hard disk in order to have a backup of it in case of SD card failure.



Flights are stored in files with the IGC standard filename. If you find it difficult to decode this standard, we recommended that you switch to detailed view to see the date of the file.
In detailed view, file date and time show the landing time of the glider.

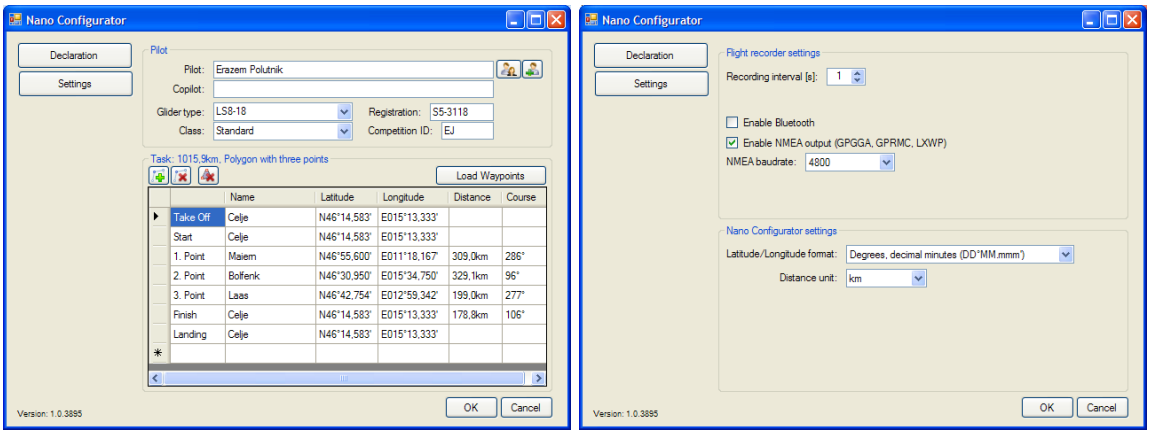
It is strongly recommended that you do not remove the SD card from the NANO to download flights. Use the USB cable to download flights from the NANO.
The SD card should only be removed if it is malfunctioning.

4.8 Bluetooth pairing

In order to connect to the NANO via Bluetooth you have to search on a PDA for devices in range. (See chapter 5.2 to enable Bluetooth) The Nano will be identified as LXNAV-NANO-<SERIALNUMBER>. Click PAIR or CONNECT to connect to the NANO. A security pin must be entered. The pin code for the NANO is 1234 and cannot be changed.

5 Configure NANO

Use the NanoConfig program to configure the NANO. A flight declaration can be uploaded or various parameters can me modified using the program. The NanoConfig program consists of two major screens. A flight declaration screen and a settings screen.



You may toggle between these two screens by pressing the **Declaration** or **Settings** button in upper left corner of the NanoConfig program.
Press the **OK** button to confirm changes and exit from the program. Press **Cancel** to abandon changes and exit without saving data.

It is important to run the NanoConfig program directly from NANO. Do not copy the NanoConfig program to another location as settings and declarations will not be written properly to the NANO.

The version of the program is written in the lower left corner of the NanoConfig window. When requesting support from LXNAV or reporting a bug, please always include the version of the program in your email.

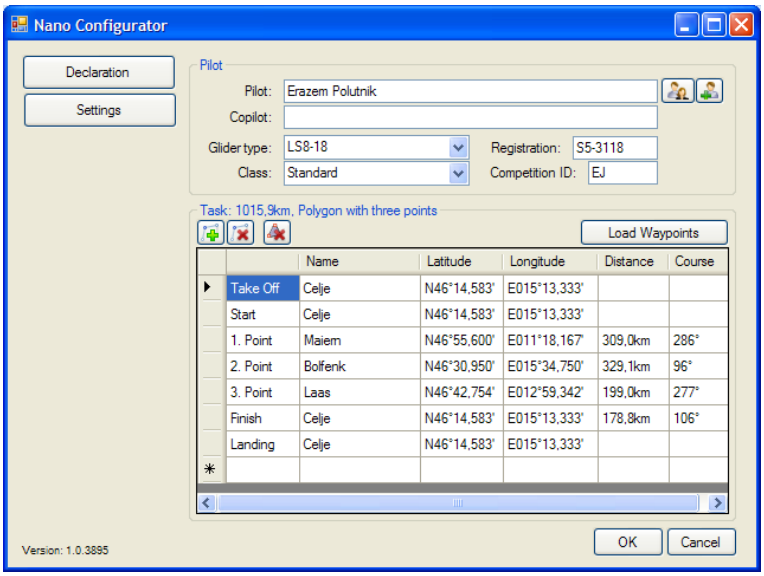
All NANO configuration variables are stored in the SYSTEM folder of the NANO in a file named "system.ini". It is strongly recommended that you do not modify this file yourself. If you need more information about the "system.ini" file please contact us.

5.1 Uploading flight declaration

Flight declarations can be uploaded to the Nano in three different ways; Using the NanoConfig program, Bluetooth or the serial interface
Declarations are stored in SYSTEM folder in a file called **decl.** The declaration file is formatted as a standard IGC header file. It is recommended that you do not try to modify this file yourself.

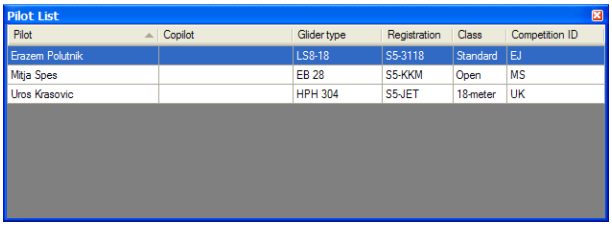
5.1.1 Using the Nanoconfig program

Run the NanoConfig program and go to the declaration screen. The declaration screen is split into two groups. Pilot and glider related information is in the top group and the task declaration is shown in the bottom group.



5.1.1.1 Pilot information

Enter pilot and glider information in the pilot section. In the top right you will find two icons. The first icon will show a list of stored pilot information and second will add current pilot information to the list.


Pilot List
Pilot Copilot Glider type Registration Class Competition ID
Erazem Polutnik LS8-18 S5-3118 Standard EJ
Mitja Spes EB 28 S5-KKM Open MS
Uros Krasovic HPH 304 S5-JET 18-meter UK

5.1.1.2 Task declaration

Before creating a task you have to load the waypoints from which the task will be created. Press the **Load Waypoints** button to load waypoints. Waypoints can be loaded from a CUP formatted file. Once waypoints are loaded you can create a task by typing the names of the waypoints. Use the icons in the upper left corner of the task declaration group to add or delete a point or to clear the whole task. Task points can also be deleted by pressing the DEL key or can be inserted by pressing the INS key.

5.1.2 Using Bluetooth or serial interface

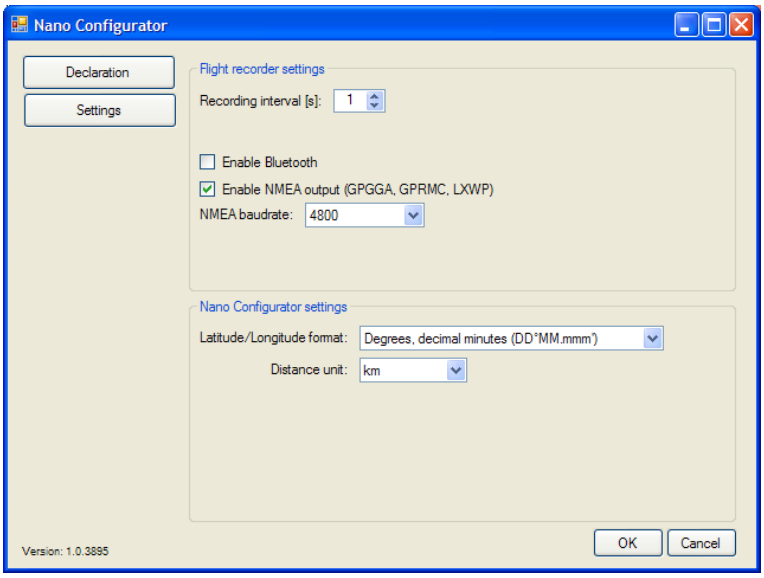
Flight declarations can also be uploaded using the serial interface or Bluetooth (See chapter 4.8 for Bluetooth pairing). The NANO must be running in normal operating mode.
The protocol used for uploading the declaration is same as used for Colibri, LX20, Posigraph or any other LX loggers.

When connecting through the serial interface you should use the same baud rate as is set for NMEA output on the NANO.
When connected through Bluetooth baud rates are not important.

Please refer to the manual for the software used to upload flight declarations. (E.g. Seeyou Mobile, pocket*Strepla, Winpilot, FlyWithCE)

5.2 Changing parameters

Run the NanoConfig program and go to the settings screen. The settings screen is split into two sections. Settings dedicated to the NANO and settings for NanoConfig.



Parameters for the NANO include recording interval, NMEA output and Bluetooth enable settings.
In NanoConfig you can change the distance units used in the task declaration and the format of latitude and longitude.

5.2.1 Flight recording interval

The flight recording interval is set to one second by default. It is recommended that you keep this setting. Even with the recording interval set to one second, the NANO is capable of storing approximately 14000hours of flight. Having a recording interval of one second will allow you to do more accurate post-flight analysis and increases the probability of obtaining a data point in the observation zone.

If you wish to change these settings, use the up/down arrow or type a new value.

5.2.2 Bluetooth

Check the **Enable Bluetooth** checkbox if you want to turn it on. By default Bluetooth is disabled.

When Bluetooth is enabled, the NANO will consume more power and the total endurance of a new and charged battery will reduce to approximately 10hours.
When Bluetooth is enabled, there will be no output on the wired serial interface and task declarations can only be uploaded via Bluetooth.

5.2.3 NMEA output

Check **Enable NMEA output** to output NMEA data. The NANO will transmit the following NMEA sentences GPGGA; GPRMC, LXWP0 every second and LXWP1 once per minute.
NMEA can be output to either the serial interface or Bluetooth but not to both simultaneously.
Change the NMEA **baud rate**, if you want to output NMEA at different baud rates.

6 Troubleshooting

Q: My computer does not recognize the NANO as a USB mass storage device?
A: Make sure that that NANO is turned off before connecting to computer.

Q: My flight has no security.
A: Switch off the NANO for five minutes and turn it on for normal operation. If the flight is still not secure contact us.

Q: When I power on see all green LEDs blinking and the red LED is illuminated.
A: This means that your flight recorder has lost security. Contact us for further details.

Q: When I power on I see one green LED and the red LED is illuminated.
A: There is a problem with the SD card. We recommend that you eject SD card and format it.

7 Revision History

September 2010	Initial release of owner manual